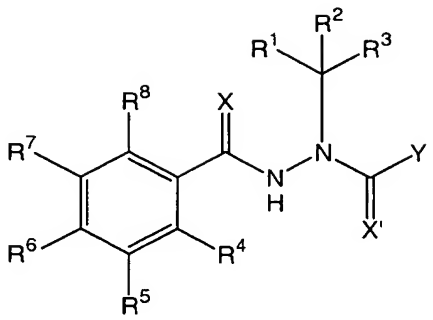
What is claimed is:

1. A compound of general formula:



wherein X and X' are independently O or S;

Y is:

(a) substituted or unsubstituted phenyl wherein the substitutents are independently 1-5 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro; or

(b) substituted or unsubstituted 2-pyridyl, 3-pyridyl, or 4-pyridyl, wherein the substitutents are independently 1-4 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro;

R^1 and R^2 are independently: H; cyano; cyano-substituted or unsubstituted (C_1-C_7) branched or straight-chain alkyl; cyano-substituted or unsubstituted (C_2-C_7) branched or straight-chain alkenyl; cyano-substituted or unsubstituted (C_3-C_7) branched or straight-chain alkenylalkyl; or together the valences of R^1 and R^2 form a (C_1-C_7) cyano-substituted or unsubstituted alkylidene group (R^aR^bC=) wherein the sum of non-substituent carbons in R^a and R^b is 0-6;

R^3 is H, methyl, ethyl, n-propyl, isopropyl, or cyano;

R^4, R^7, and R^8 are independently: H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro; and

R^5 and R^6 are independently: H, (C_1-C_4)alkyl, (C_2-C_4)alkenyl, (C_3-C_4) alkenylalkyl, halo (F, Cl, Br, I), C_1-C_4 haloalkyl, (C_1-C_4)alkoxy, hydroxy, amino, cyano, nitro, or together as a linkage of the type (–$OCHR^9CHR^{10}O$-) form a ring with the phenyl carbons to which they are attached; wherein R^9 and R^{10} are independently: H, halo, (C_1-C_3)alkyl, (C_2-C_3)alkenyl, (C_1-C_3)alkoxy(C_1-C_3)alkyl, benzoyloxy(C_1-C_3)alkyl, hydroxy(C_1-C_3)alkyl, halo(C_1-C_3)alkyl, formyl, formyl(C_1-C_3)alkyl, cyano, cyano(C_1-

C_3)alkyl, carboxy, carboxy(C_1-C_3)alkyl, (C_1-C_3)alkoxycarbonyl(C_1-C_3)alkyl, (C_1-C_3)alkylcarbonyl(C_1-C_3)alkyl, (C_1-C_3)alkanoyloxy(C_1-C_3)alkyl, amino(C_1-C_3)alkyl, (C_1-C_3)alkylamino(C_1-C_3)alkyl (–$(CH_2)_nR^eR^e$), oximo (-CH=NOH), oximo(C_1-C_3)alkyl, (C_1-C_3)alkoximo (-C=NOR^d), alkoximo(C_1-C_3)alkyl, (C_1-C_3)carboxamido (-C(O)NR^{e}R^f), (C_1-C_3)carboxamido(C_1-C_3)alkyl, (C_1-C_3)semicarbazido (-C=NNHC(O)NR^{e}R^f), semicarbazido(C_1-C_3)alkyl, aminocarbonyloxy (-OC(O)NHR^g), aminocarbonyloxy(C_1-C_3)alkyl, pentafluorophenyloxycarbonyl, pentafluorophenyloxycarbonyl(C_1-C_3)alkyl, p-toluenesulfonyloxy(C_1-C_3)alkyl, arylsulfonyloxy(C_1-C_3)alkyl, (C_1-C_3)thio(C_1-C_3)alkyl, (C_1-C_3)alkylsulfoxido(C_1-C_3)alkyl, (C_1-C_3)alkylsulfonyl(C_1-C_3)alkyl, or (C_1-C_5)trisubstituted-siloxy(C_1-C_3)alkyl (-$(CH_2)_nSiOR^dR^eR^g$); wherein n=1-3, R^c and R^d represent straight or branched hydrocarbon chains of the indicated length, R^e, R^f represent H or straight or branched hydrocarbon chains of the indicated length, R^g represents (C_1-C_3)alkyl or aryl optionally substituted with halo or (C_1-C_3)alkyl, and R^c, R^d, R^e, R^f, and R^g are independent of one another;

provided that

i when R^9 and R^{10} are both H, or

ii when either R^9 or R^{10} are halo, (C_1-C_3)alkyl, (C_1-C_3)alkoxy(C_1-C_3)alkyl, or benzoyloxy(C_1-C_3)alkyl, or

iii when R^5 and R^6 do not together form a linkage of the type (–OCHR^{9}CHR^{10}O-),

then the number of carbon atoms, excluding those of cyano substitution, for either or both of groups R^1 or R^2 is greater than 4, and the number of carbon atoms, excluding those of cyano substitution, for the sum of groups R^1, R^2, and R^3 is 10, 11, or 12.

2. The compound of claim 1, wherein:

X and X' are O;

Y is:

(a) substituted or unsubstituted phenyl wherein the substitutents are independently 1-5 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, cyano, or nitro; or

(b) substituted or unsubstituted 2-pyridyl, 3-pyridyl, or 4-pyridyl, wherein the substitutents are independently 1-4 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, cyano, or nitro;

R^1 and R^2 are independently: H; cyano; cyano-substituted or unsubstituted (C_1-C_7) branched or straight-chain alkyl; cyano-substituted or unsubstituted (C_2-C_7) branched or straight-chain alkenyl;

cyano-substituted or unsubstituted (C_3-C_7) branched or straight-chain alkenylalkyl; or together the valences of R^1 and R^2 form a (C_1-C_7) cyano-substituted or unsubstituted alkylidene group (R^aR^bC=) wherein the sum of non-substituent carbons in R^a and R^b is 0-6;

R^3 is H, methyl, ethyl, or cyano;

R^4, R^7, and R^8 are independently: H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, cyano, or nitro; and

R^5 and R^6 are independently: H, (C_1-C_4)alkyl, halo (F, Cl, Br, I), C_1-C_4 haloalkyl, (C_1-C_4)alkoxy, hydroxy, amino, cyano, nitro, or together as a linkage of the type (–OCHR^{9}CHR^{10}O-) form a ring with the phenyl carbons to which they are attached; wherein R^9 or R^{10} is H, and the alternate R^9 or R^{10} is: H, halo(C_1-C_3)alkyl, formyl, formyl(C_1-C_3)alkyl, cyano, cyano(C_1-C_3)alkyl, carboxy, carboxy(C_1-C_3)alkyl, amino(C_1-C_3)alkyl, (C_1-C_3)alkylamino(C_1-C_3)alkyl (–$(CH_2)_nR^cR^e$), oximo (-CH=NOH), oximo(C_1-C_3)alkyl, (C_1-C_3)alkoximo (-C=NOR^d), alkoximo(C_1-C_3)alkyl, (C_1-C_3)carboxamido (-C(O)NR^{e}R^f), (C_1-C_3)carboxamido(C_1-C_3)alkyl, (C_1-C_3)semicarbazido (-C=NNHC(O)NR^{e}R^f), semicarbazido(C_1-C_3)alkyl, aminocarbonyloxy (-OC(O)NHR^g), aminocarbonyloxy(C_1-C_3)alkyl, pentafluorophenyloxycarbonyl, pentafluorophenyloxycarbonyl(C_1-C_3)alkyl, p-toluenesulfonyloxy(C_1-C_3)alkyl, arylsulfonyloxy(C_1-C_3)alkyl, (C_1-C_3)thio(C_1-C_3)alkyl, (C_1-C_3)alkylsulfoxido(C_1-C_3)alkyl, (C_1-C_3)alkylsulfonyl(C_1-C_3)alkyl, or (C_1-C_5)trisubstituted-siloxy(C_1-C_3)alkyl (-$(CH_2)_n$SiOR^{d}R^{e}R^g); wherein n=1-3, R^c and R^d represent straight or branched hydrocarbon chains of the indicated length, R^e, R^f represent H or straight or branched hydrocarbon chains of the indicated length, R^g represents (C_1-C_3)alkyl or aryl optionally substituted with halo or (C_1-C_3)alkyl, and R^c, R^d, R^e, R^f, and R^g are independent of one another;

provided that

i when R^9 and R^{10} are both H, or

ii when R^5 and R^6 do not together form a linkage of the type (–OCHR^{9}CHR^{10}O-),

then the number of carbon atoms, excluding those of cyano substitution, for either or both of groups R^1 or R^2 is greater than 4, and the number of carbon atoms, excluding those of cyano substitution, for the sum of groups R^1, R^2, and R^3 is 10, 11, or 12.

3. The compound of claim 2 wherein:

X and X' are O;

Y is:

(a) substituted or unsubstituted phenyl wherein the substitutents are independently 1-5 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, cyano, or nitro; or

(b) substituted or unsubstituted 2-pyridyl, 3-pyridyl, or 4-pyridyl, wherein the substitutents are independently 1-4 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, cyano, or nitro;

R^1 and R^2 are independently: H; cyano; cyano-substituted or unsubstituted (C_1-C_7) branched or straight-chain alkyl; cyano-substituted or unsubstituted (C_2-C_7) branched or straight-chain alkenyl; cyano-substituted or unsubstituted (C_3-C_7) branched or straight-chain alkenylalkyl; or together the valences of R^1 and R^2 form a (C_1-C_7) cyano-substituted or unsubstituted alkylidene group (R^aR^bC=) wherein the sum of non-substituent carbons in R^a and R^b is 0-6;

R^3 is H, methyl, ethyl, or cyano;

R^4, R^7, and R^8 are independently: H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, cyano, or nitro; and

R^5 and R^6 are independently: H, (C_1-C_4)alkyl, halo (F, Cl, Br, I), C_1-C_4 haloalkyl, (C_1-C_4)alkoxy, hydroxy, amino, cyano, nitro, or together as a linkage of the type (–$OCHR^9CHR^{10}O$-) form a ring with the phenyl carbons to which they are attached; wherein R^9 or R^{10} is H, and the alternate R^9 or R^{10} is: H, halo(C_1-C_3)alkyl, formyl, formyl(C_1-C_3)alkyl, cyano, cyano(C_1-C_3)alkyl, carboxy, carboxy(C_1-C_3)alkyl, amino(C_1-C_3)alkyl, (C_1-C_3)alkylamino(C_1-C_3)alkyl (–$(CH_2)_nR^cR^e$), oximo (-CH=NOH), oximo(C_1-C_3)alkyl, (C_1-C_3)alkoximo (-C=NOR^d), alkoximo(C_1-C_3)alkyl, (C_1-C_3)carboxamido (-$C(O)NR^eR^f$), (C_1-C_3)carboxamido(C_1-C_3)alkyl, (C_1-C_3)semicarbazido (-C=$NNHC(O)NR^eR^f$), semicarbazido(C_1-C_3)alkyl, aminocarbonyloxy (-$OC(O)NHR^g$), aminocarbonyloxy(C_1-C_3)alkyl, pentafluorophenyloxycarbonyl, pentafluorophenyloxycarbonyl(C_1-C_3)alkyl, p-toluenesulfonyloxy(C_1-C_3)alkyl, arylsulfonyloxy(C_1-C_3)alkyl, (C_1-C_3)thio(C_1-C_3)alkyl, (C_1-C_3)alkylsulfoxido(C_1-C_3)alkyl, (C_1-C_3)alkylsulfonyl(C_1-C_3)alkyl, or (C_1-C_5)trisubstituted-siloxy(C_1-C_3)alkyl (-$(CH_2)_nSiOR^dR^eR^g$); wherein n=1-3, R^c and R^d represent straight or branched hydrocarbon chains of the indicated length, R^e, R^f represent H or straight or branched hydrocarbon chains of the indicated length, R^g represents (C_1-C_3)alkyl or aryl optionally substituted with halo or (C_1-C_3)alkyl, and R^c, R^d, R^e, R^f, and R^g are independent of one another;

provided that

i when R^9 and R^{10} are both H, or

ii when R^5 and R^6 do not together form a linkage of the type (–$OCHR^9CHR^{10}O$-),

then the number of carbon atoms, excluding those of cyano substitution, for either or both of groups R^1 or R^2 is greater than 4, and the number of carbon atoms, excluding those of cyano substitution, for the sum of groups R^1, R^2, and R^3 is 10, 11, or 12; and

when R^5 and R^6 together as a linkage of the type (–$OCHR^9CHR^{10}O$-) form a ring with the phenyl carbons to which they are attached, and R^9 and R^{10} are not both H,

then R^1 and R^2 are (C_1-C_4) straight or branched alkyl, and R^3 is H or methyl.

4. The compound of claim 3 wherein:

X and X' are O;

Y is:

(a) substituted or unsubstituted phenyl wherein the substitutents are independently 1-5 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl; or

(b) substituted or unsubstituted 3-pyridyl, wherein the substitutents are independently 1-4 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl;

R^1 and R^2 are independently: H; cyano; cyano-substituted or unsubstituted (C_1-C_7) branched or straight-chain alkyl; cyano-substituted or unsubstituted (C_2-C_7) branched or straight-chain alkenyl; cyano-substituted or unsubstituted (C_3-C_7) branched or straight-chain alkenylalkyl; or together the valences of R^1 and R^2 form a (C_1-C_7) cyano-substituted or unsubstituted alkylidene group (R^aR^bC=) wherein the sum of non-substituent carbons in R^a and R^b is 0-3;

R^3 is methyl;

R^4, R^7, and R^8 are independently selected from: H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl; and

R^5 and R^6 are independently: H, (C_1-C_4)alkyl, halo (F, Cl, Br, I), C_1-C_4 haloalkyl, (C_1-C_4)alkoxy, or together as a linkage of the type (–$OCHR^9CHR^{10}O$-) form a ring with the phenyl carbons to which they are attached; wherein R^9 or R^{10} is H, and the alternate R^9 or R^{10} is: H, halo(C_1-C_2)alkyl, formyl, cyano(C_1-C_2)alkyl, carboxy, amino(C_1-C_2)alkyl, oximo (-CH=NOH), (C_1-C_3)carboxamido (-$C(O)NR^eR^f$), (C_1-C_2)semicarbazido (-$C{=}NNHC(O)NR^eR^f$), aminocarbonyloxy (-$OC(O)NHR^g$), pentafluorophenyloxycarbonyl, p-toluenesulfonyloxy(C_1-C_3)alkyl, methylthio(C_1-C_2)alkyl, methylsulfoxido(C_1-C_2)alkyl, methylsulfonyl(C_1-C_2)alkyl, or (C_1-C_5)trisubstituted-siloxy(C_1-C_3)alkyl (-$(CH_2)_nSiOR^dR^eR^g$); wherein n=1-3, R^d represents a straight or branched hydrocarbon chain of the indicated length, R^e, R^f represent H or straight or branched hydrocarbon chains of the indicated length,

R^g represents (C_1-C_3)alkyl or aryl optionally substituted with halo or (C_1-C_3)alkyl, and R^c, R^d, R^e, R^f, and R^g are independent of one another;

provided that

i) when R^9 and R^{10} are both H, or

ii) when R^5 and R^6 do not together form a linkage of the type (–$OCHR^9CHR^{10}O$-),

then the number of carbon atoms, excluding those of cyano substitution, for either or both of groups R^1 or R^2 is greater than 4, and the number of carbon atoms, excluding those of cyano substitution, for the sum of groups R^1, R^2, and R^3 is 10, 11, or 12; and

when R^5 and R^6 together as a linkage of the type (–$OCHR^9CHR^{10}O$-) form a ring with the phenyl carbons to which they are attached, and R^9 and R^{10} are not both H,

then R^1 and R^2 are methyl.

5. The compound of claim 4 selected from the group consisting of:

a) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-(3-hydroxymethyl-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl)-hydrazide,

b) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-[3-(tert-butyl-dimethyl-silanyloxymethyl)-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl]-hydrazide,

c) 7-[N'-tert-Butyl-N'-(3,5-dimethyl-benzoyl)-hydrazinocarbonyl]-8-methyl-2,3-dihydro-benzo[1,4]dioxine-2-carboxylic acid,

d) 7-[N'-tert-Butyl-N'-(3,5-dimethyl-benzoyl)-hydrazinocarbonyl]-8-methyl-2,3-dihydro-benzo[1,4]dioxine-2-carboxylic acid methyl ester,

e) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-(3-semicarbazidomethyl-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl)-hydrazide,

f) Phenyl-carbamic acid 7-[N'-tert-butyl-N'-(3,5-dimethyl-benzoyl)-hydrazinocarbonyl]-8-methyl-2,3-dihydro-benzo[1,4]dioxin-2-ylmethyl ester,

g) 3,5-Dimethyl-benzoic acid N'-[3-(2-amino-ethyl)-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl]-N-tert-butyl-hydrazide,

h) 7-[N'-tert-Butyl-N'-(3,5-dimethyl-benzoyl)-hydrazinocarbonyl]-8-methyl-2,3-dihydro-benzo[1,4]dioxine-2-carboxylic acid pentafluorophenyl ester,

i) 7-[N'-tert-Butyl-N'-(3,5-dimethyl-benzoyl)-hydrazinocarbonyl]-8-methyl-2,3-dihydro-benzo[1,4]dioxine-2-carboxylic acid methylamide,

j) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-(3-formyl-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl)-hydrazide,

k) Toluene-4-sulfonic acid 7-[N'-tert-butyl-N'-(3,5-dimethyl-benzoyl)-hydrazinocarbonyl]-8-methyl-2,3-dihydro-benzo[1,4]dioxin-2-ylmethyl ester,

l) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-[3-(hydroxyimino-methyl)-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl]-hydrazide,

m) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-(3-cyanomethyl-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl)-hydrazide,

n) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-(5-methyl-3-methylsulfanylmethyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl)-hydrazide,

o) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-(3-methanesulfonylmethyl-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl)-hydrazide,

p) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-(3-fluoromethyl-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl)-hydrazide,

q) 3,5-Dimethyl-benzoic acid N-(1-tert-butyl-heptyl)-N'-(3-methoxy-2-methyl-benzoyl)-hydrazide,

r) 3,5-Dimethyl-benzoic acid N-(1-tert-butyl-heptyl)-N'-(4-ethyl-benzoyl)-hydrazide,

s) 3,5-Dimethoxy-4-methyl-benzoic acid-N-(1-tert-butyl-heptyl)-N'-(3-methoxy-2-methyl-benzoyl)-hydrazide,

t) 3,5-Dimethoxy-4-methyl-benzoic acid-N-(1-tert-butyl-heptyl)-N'-(4-ethyl-benzoyl)-hydrazide,

u) 2-Methoxy-nicotinic acid N-(1-tert-butyl-heptyl)-N'-(4-ethyl-benzoyl)-hydrazide,

v) 3,5-Dimethyl-benzoic acid N-(1-tert-butyl-3,4,4-trimethyl-pent-2-enyl)-N'-(3-methoxy-2-methyl-benzoyl)-hydrazide,

w) 3,5-Dimethyl-benzoic acid N-(1-tert-butyl-2-cyano-vinyl)-N'-(3-methoxy-2-methyl-benzoyl)-hydrazide,

x) 3,5-Dimethyl-benzoic acid N-(1-butyl-2,2-dimethyl-pentyl)-N'-(3-methoxy-2-methyl-benzoyl)-hydrazide, and

y) 3,5-Dimethyl-benzoic acid N-(1-butyl-2,2-dimethyl-pent-4-enyl)-N'-(3-methoxy-2-methyl-benzoyl)-hydrazide.

6. A method of modulating the expression of a target gene in a host cell, wherein the host cell includes a first gene expression cassette comprising a first polynucleotide encoding a first polypeptide comprising:

(i) a transactivation domain;

(ii) a DNA-binding domain; and

(iii) a Group H nuclear receptor ligand binding domain;

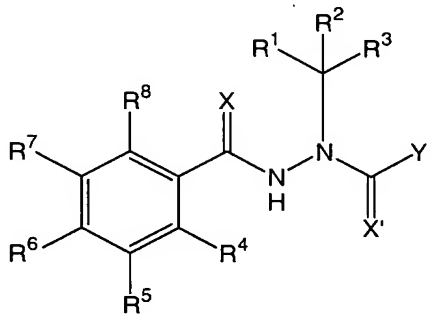
a second gene expression cassette comprising:

(i) a response element capable of binding to said DNA binding domain;

(ii) a promoter that is activated by the transactivation domain; and

(iii) said target gene;

the method comprising contacting said host cell with a compound of the formula:



wherein X and X' are independently O or S;

Y is:

(a) substituted or unsubstituted phenyl wherein the substitutents are independently 1-5 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro; or

(b) substituted or unsubstituted 2-pyridyl, 3-pyridyl, or 4-pyridyl, wherein the substitutents are independently 1-4 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro;

R^1 and R^2 are independently: H; cyano; cyano-substituted or unsubstituted (C_1-C_7) branched or straight-chain alkyl; cyano-substituted or unsubstituted (C_2-C_7) branched or straight-chain alkenyl; cyano-substituted or unsubstituted (C_3-C_7) branched or straight-chain alkenylalkyl; or together the valences of R^1 and R^2 form a (C_1-C_7) cyano-substituted or unsubstituted alkylidene group (R^aR^bC=) wherein the sum of non-substituent carbons in R^a and R^b is 0-6;

R^3 is H, methyl, ethyl, n-propyl, isopropyl, or cyano;

R^4, R^7, and R^8 are independently: H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro; and

R^5 and R^6 are independently: H, (C_1-C_4)alkyl, (C_2-C_4)alkenyl, (C_3-C_4) alkenylalkyl, halo (F, Cl, Br, I), C_1-C_4 haloalkyl, (C_1-C_4)alkoxy, hydroxy, amino, cyano, nitro, or together as a linkage of the type (–$OCHR^9CHR^{10}O$-) form a ring with the phenyl carbons to which they are attached; wherein R^9 and R^{10} are independently: H, halo, (C_1-C_3)alkyl, (C_2-C_3)alkenyl, (C_1-C_3)alkoxy(C_1-C_3)alkyl, benzoyloxy(C_1-C_3)alkyl, hydroxy(C_1-C_3)alkyl, halo(C_1-C_3)alkyl, formyl, formyl(C_1-C_3)alkyl, cyano, cyano(C_1-C_3)alkyl, carboxy, carboxy(C_1-C_3)alkyl, (C_1-C_3)alkoxycarbonyl(C_1-C_3)alkyl, (C_1-C_3)alkylcarbonyl(C_1-C_3)alkyl, (C_1-C_3)alkanoyloxy(C_1-C_3)alkyl, amino(C_1-C_3)alkyl, (C_1-C_3)alkylamino(C_1-C_3)alkyl (–$(CH_2)_nR^cR^e$), oximo (-CH=NOH), oximo(C_1-C_3)alkyl, (C_1-C_3)alkoximo (-C=NOR^d), alkoximo(C_1-C_3)alkyl, (C_1-C_3)carboxamido (-$C(O)NR^eR^f$), (C_1-C_3)carboxamido(C_1-C_3)alkyl, (C_1-C_3)semicarbazido (-C=$NNHC(O)NR^eR^f$), semicarbazido(C_1-C_3)alkyl, aminocarbonyloxy (-$OC(O)NHR^g$), aminocarbonyloxy(C_1-C_3)alkyl, pentafluorophenyloxycarbonyl, pentafluorophenyloxycarbonyl(C_1-C_3)alkyl, p-toluenesulfonyloxy(C_1-C_3)alkyl, arylsulfonyloxy(C_1-C_3)alkyl, (C_1-C_3)thio(C_1-C_3)alkyl, (C_1-C_3)alkylsulfoxido(C_1-C_3)alkyl, (C_1-C_3)alkylsulfonyl(C_1-C_3)alkyl, or (C_1-C_5)trisubstituted-siloxy(C_1-C_3)alkyl (-$(CH_2)_nSiOR^dR^eR^g$); wherein n=1-3, R^c and R^d represent straight or branched hydrocarbon chains of the indicated length, R^e, R^f represent H or straight or branched hydrocarbon chains of the indicated length, R^g represents (C_1-C_3)alkyl or aryl optionally substituted with halo or (C_1-C_3)alkyl, and R^c, R^d, R^e, R^f, and R^g are independent of one another;

provided that

i when R^9 and R^{10} are both H, or

ii when either R^9 or R^{10} are halo, (C_1-C_3)alkyl, (C_1-C_3)alkoxy(C_1-C_3)alkyl, or benzoyloxy(C_1-C_3)alkyl, or

iii when R^5 and R^6 do not together form a linkage of the type (–$OCHR^9CHR^{10}O$-), then the number of carbon atoms, excluding those of cyano substitution, for either or both of groups R^1 or R^2 is greater than 4, and the number of carbon atoms, excluding those of cyano substitution, for the sum of groups R^1, R^2, and R^3 is 10, 11, or 12.

7. The method of claim 6 wherein the compound is of the specified formula and:

X and X' are O;

Y is:

(a) substituted or unsubstituted phenyl wherein the substitutents are independently 1-5 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, cyano, or nitro; or

(b) substituted or unsubstituted 2-pyridyl, 3-pyridyl, or 4-pyridyl, wherein the substitutents are independently 1-4 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, cyano, or nitro;

R^1 and R^2 are independently: H; cyano; cyano-substituted or unsubstituted (C_1-C_7) branched or straight-chain alkyl; cyano-substituted or unsubstituted (C_2-C_7) branched or straight-chain alkenyl; cyano-substituted or unsubstituted (C_3-C_7) branched or straight-chain alkenylalkyl; or together the valences of R^1 and R^2 form a (C_1-C_7) cyano-substituted or unsubstituted alkylidene group (R^aR^bC=) wherein the sum of non-substituent carbons in R^a and R^b is 0-6;

R^3 is H, methyl, ethyl, or cyano;

R^4, R^7, and R^8 are independently: H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, cyano, or nitro; and

R^5 and R^6 are independently: H, (C_1-C_4)alkyl, halo (F, Cl, Br, I), C_1-C_4 haloalkyl, (C_1-C_4)alkoxy, hydroxy, amino, cyano, nitro, or together as a linkage of the type (–$OCHR^9CHR^{10}O$-) form a ring with the phenyl carbons to which they are attached; wherein R^9 or R^{10} is H, and the alternate R^9 or R^{10} is: H, halo(C_1-C_3)alkyl, formyl, formyl(C_1-C_3)alkyl, cyano, cyano(C_1-C_3)alkyl, carboxy, carboxy(C_1-C_3)alkyl, amino(C_1-C_3)alkyl, (C_1-C_3)alkylamino(C_1-C_3)alkyl (–$(CH_2)_nR^cR^e$), oximo (-CH=NOH), oximo(C_1-C_3)alkyl, (C_1-C_3)alkoximo (-C=NOR^d), alkoximo(C_1-C_3)alkyl, (C_1-C_3)carboxamido (-$C(O)NR^cR^f$), (C_1-C_3)carboxamido(C_1-C_3)alkyl, (C_1-C_3)semicarbazido (-C=$NNHC(O)NR^cR^f$), semicarbazido(C_1-C_3)alkyl, aminocarbonyloxy (-$OC(O)NHR^g$), aminocarbonyloxy(C_1-C_3)alkyl, pentafluorophenyloxycarbonyl, pentafluorophenyloxycarbonyl(C_1-C_3)alkyl, p-toluenesulfonyloxy(C_1-C_3)alkyl, arylsulfonyloxy(C_1-C_3)alkyl, (C_1-C_3)thio(C_1-C_3)alkyl, (C_1-C_3)alkylsulfoxido(C_1-C_3)alkyl, (C_1-C_3)alkylsulfonyl(C_1-C_3)alkyl, or (C_1-C_5)trisubstituted-siloxy(C_1-C_3)alkyl (-$(CH_2)_nSiOR^dR^eR^g$);

wherein n=1-3, R^c and R^d represent straight or branched hydrocarbon chains of the indicated length, R^e, R^f represent H or straight or branched hydrocarbon chains of the indicated length, R^g represents (C_1-C_3)alkyl or aryl optionally substituted with halo or (C_1-C_3)alkyl, and R^c, R^d, R^e, R^f, and R^g are independent of one another;

provided that

i when R^9 and R^{10} are both H, or

ii when R^5 and R^6 do not together form a linkage of the type $(-OCHR^9CHR^{10}O-)$,

then the number of carbon atoms, excluding those of cyano substitution, for either or both of groups R^1 or R^2 is greater than 4, and the number of carbon atoms, excluding those of cyano substitution, for the sum of groups R^1, R^2, and R^3 is 10, 11, or 12.

8. The method of Claim 7 wherein the compound is of the specified formula and:

X and X' are O;

Y is:

(a) substituted or unsubstituted phenyl wherein the substitutents are independently 1-5 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, cyano, or nitro; or

(b) substituted or unsubstituted 2-pyridyl, 3-pyridyl, or 4-pyridyl, wherein the substitutents are independently 1-4 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, cyano, or nitro;

R^1 and R^2 are independently: H; cyano; cyano-substituted or unsubstituted (C_1-C_7) branched or straight-chain alkyl; cyano-substituted or unsubstituted (C_2-C_7) branched or straight-chain alkenyl; cyano-substituted or unsubstituted (C_3-C_7) branched or straight-chain alkenylalkyl; or together the valences of R^1 and R^2 form a (C_1-C_7) cyano-substituted or unsubstituted alkylidene group $(R^aR^bC=)$ wherein the sum of non-substituent carbons in R^a and R^b is 0-6;

R^3 is H, methyl, ethyl, or cyano;

R^4, R^7, and R^8 are independently: H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, cyano, or nitro; and

R^5 and R^6 are independently: H, $(C_1$-$C_4)$alkyl, halo (F, Cl, Br, I), C_1-C_4 haloalkyl, $(C_1$-$C_4)$alkoxy, hydroxy, amino, cyano, nitro, or together as a linkage of the type (–$OCHR^9CHR^{10}O$-) form a ring with the phenyl carbons to which they are attached; wherein R^9 or R^{10} is H, and the alternate R^9 or R^{10} is: H, halo$(C_1$-$C_3)$alkyl, formyl, formyl$(C_1$-$C_3)$alkyl, cyano, cyano$(C_1$-$C_3)$alkyl, carboxy, carboxy$(C_1$-$C_3)$alkyl, amino$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$alkylamino$(C_1$-$C_3)$alkyl (–$(CH_2)_nR^cR^e$), oximo (-CH=NOH), oximo$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$alkoximo (-C=NOR^d), alkoximo$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$carboxamido (-$C(O)NR^eR^f$), $(C_1$-$C_3)$carboxamido$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$semicarbazido (-C=$NNHC(O)NR^eR^f$), semicarbazido$(C_1$-$C_3)$alkyl, aminocarbonyloxy (-$OC(O)NHR^g$), aminocarbonyloxy$(C_1$-$C_3)$alkyl, pentafluorophenyloxycarbonyl, pentafluorophenyloxycarbonyl$(C_1$-$C_3)$alkyl, p-toluenesulfonyloxy$(C_1$-$C_3)$alkyl, arylsulfonyloxy$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$thio$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$alkylsulfoxido$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$alkylsulfonyl$(C_1$-$C_3)$alkyl, or $(C_1$-$C_5)$trisubstituted-siloxy$(C_1$-$C_3)$alkyl (-$(CH_2)_nSiOR^dR^eR^g$); wherein n=1-3, R^c and R^d represent straight or branched hydrocarbon chains of the indicated length, R^e, R^f represent H or straight or branched hydrocarbon chains of the indicated length, R^g represents $(C_1$-$C_3)$alkyl or aryl optionally substituted with halo or $(C_1$-$C_3)$alkyl, and R^c, R^d, R^e, R^f, and R^g are independent of one another;

provided that

i when R^9 and R^{10} are both H, or

ii when R^5 and R^6 do not together form a linkage of the type (–$OCHR^9CHR^{10}O$-),

then the number of carbon atoms, excluding those of cyano substitution, for either or both of groups R^1 or R^2 is greater than 4, and the number of carbon atoms, excluding those of cyano substitution, for the sum of groups R^1, R^2, and R^3 is 10, 11, or 12; and

when R^5 and R^6 together as a linkage of the type (–$OCHR^9CHR^{10}O$-) form a ring with the phenyl carbons to which they are attached, and R^9 and R^{10} are not both H,
then R^1 and R^2 are $(C_1$-$C_4)$ straight or branched alkyl, and R^3 is H or methyl.

9. The method of Claim 8 wherein the compound is of the specified formula and:

X and X' are O;

Y is:

(a) substituted or unsubstituted phenyl wherein the substituents are independently 1-5 H, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkoxy, halo (F, Cl, Br, I), $(C_1$-$C_4)$haloalkyl; or

(b) substituted or unsubstituted 3-pyridyl, wherein the substitutents are independently 1-4 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl;

R^1 and R^2 are independently: H; cyano; cyano-substituted or unsubstituted (C_1-C_7) branched or straight-chain alkyl; cyano-substituted or unsubstituted (C_2-C_7) branched or straight-chain alkenyl; cyano-substituted or unsubstituted (C_3-C_7) branched or straight-chain alkenylalkyl; or together the valences of R^1 and R^2 form a (C_1-C_7) cyano-substituted or unsubstituted alkylidene group (R^aR^bC=) wherein the sum of non-substituent carbons in R^a and R^b is 0-3;

R^3 is methyl;

R^4, R^7, and R^8 are independently selected from: H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl; and

R^5 and R^6 are independently: H, (C_1-C_4)alkyl, halo (F, Cl, Br, I), C_1-C_4 haloalkyl, (C_1-C_4)alkoxy, or together as a linkage of the type (–$OCHR^9CHR^{10}O$-) form a ring with the phenyl carbons to which they are attached; wherein R^9 or R^{10} is H, and the alternate R^9 or R^{10} is: H, halo(C_1-C_2)alkyl, formyl, cyano(C_1-C_2)alkyl, carboxy, amino(C_1-C_2)alkyl, oximo (-CH=NOH), (C_1-C_3)carboxamido (-$C(O)NR^eR^f$), (C_1-C_2)semicarbazido (-C=$NNHC(O)NR^eR^f$), aminocarbonyloxy (-$OC(O)NHR^g$), pentafluorophenyloxycarbonyl, p-toluenesulfonyloxy(C_1-C_3)alkyl, methylthio(C_1-C_2)alkyl, methylsulfoxido(C_1-C_2)alkyl, methylsulfonyl(C_1-C_2)alkyl, or (C_1-C_5)trisubstituted-siloxy(C_1-C_3)alkyl (-$(CH_2)_nSiOR^dR^eR^g$); wherein n=1-3, R^d represent a straight or branched hydrocarbon chain of the indicated length, R^e, R^f represent H or straight or branched hydrocarbon chains of the indicated length, R^g represents (C_1-C_3)alkyl or aryl optionally substituted with halo or (C_1-C_3)alkyl, and R^c, R^d, R^e, R^f, and R^g are independent of one another;

provided that

i) when R^9 and R^{10} are both H, or

ii) when R^5 and R^6 do not together form a linkage of the type (–$OCHR^9CHR^{10}O$-),

then the number of carbon atoms, excluding those of cyano substitution, for either or both of groups R^1 or R^2 is greater than 4, and the number of carbon atoms, excluding those of cyano substitution, for the sum of groups R^1, R^2, and R^3 is 10, 11, or 12; and

when R^5 and R^6 together as a linkage of the type (–$OCHR^9CHR^{10}O$-) form a ring with the phenyl carbons to which they are attached, and R^9 and R^{10} are not both H,
then R^1 and R^2 are methyl.

10. The method of claim 9, wherein the compound is selected from the group consisting of:

a) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-(3-hydroxymethyl-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl)-hydrazide,

b) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-[3-(tert-butyl-dimethyl-silanyloxymethyl)-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl]-hydrazide,

c) 7-[N'-tert-Butyl-N'-(3,5-dimethyl-benzoyl)-hydrazinocarbonyl]-8-methyl-2,3-dihydro-benzo[1,4]dioxine-2-carboxylic acid,

d) 7-[N'-tert-Butyl-N'-(3,5-dimethyl-benzoyl)-hydrazinocarbonyl]-8-methyl-2,3-dihydro-benzo[1,4]dioxine-2-carboxylic acid methyl ester,

e) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-(3-semicarbazidomethyl-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl)-hydrazide,

f) Phenyl-carbamic acid 7-[N'-tert-butyl-N'-(3,5-dimethyl-benzoyl)-hydrazinocarbonyl]-8-methyl-2,3-dihydro-benzo[1,4]dioxin-2-ylmethyl ester,

g) 3,5-Dimethyl-benzoic acid N'-[3-(2-amino-ethyl)-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl]-N-tert-butyl-hydrazide,

h) 7-[N'-tert-Butyl-N'-(3,5-dimethyl-benzoyl)-hydrazinocarbonyl]-8-methyl-2,3-dihydro-benzo[1,4]dioxine-2-carboxylic acid pentafluorophenyl ester,

i) 7-[N'-tert-Butyl-N'-(3,5-dimethyl-benzoyl)-hydrazinocarbonyl]-8-methyl-2,3-dihydro-benzo[1,4]dioxine-2-carboxylic acid methylamide,

j) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-(3-formyl-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl)-hydrazide,

k) Toluene-4-sulfonic acid 7-[N'-tert-butyl-N'-(3,5-dimethyl-benzoyl)-hydrazinocarbonyl]-8-methyl-2,3-dihydro-benzo[1,4]dioxin-2-ylmethyl ester,

l) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-[3-(hydroxyimino-methyl)-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl]-hydrazide,

m) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-(3-cyanomethyl-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl)-hydrazide,

n) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-(5-methyl-3-methylsulfanylmethyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl)-hydrazide,

o) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-(3-methanesulfonylmethyl-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl)-hydrazide,

p) 3,5-Dimethyl-benzoic acid N-tert-butyl-N'-(3-fluoromethyl-5-methyl-2,3-dihydro-benzo[1,4]dioxine-6-carbonyl)-hydrazide,

q) 3,5-Dimethyl-benzoic acid N-(1-tert-butyl-heptyl)-N'-(3-methoxy-2-methyl-benzoyl)-hydrazide,

r) 3,5-Dimethyl-benzoic acid N-(1-tert-butyl-heptyl)-N'-(4-ethyl-benzoyl)-hydrazide,

s) 3,5-Dimethoxy-4-methyl-benzoic acid-N-(1-tert-butyl-heptyl)-N'-(3-methoxy-2-methyl-benzoyl)-hydrazide,

t) 3,5-Dimethoxy-4-methyl-benzoic acid-N-(1-tert-butyl-heptyl)-N'-(4-ethyl-benzoyl)-hydrazide,

u) 2-Methoxy-nicotinic acid N-(1-tert-butyl-heptyl)-N'-(4-ethyl-benzoyl)-hydrazide,

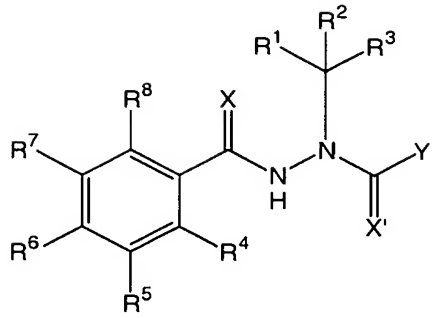
v) 3,5-Dimethyl-benzoic acid N-(1-tert-butyl-3,4,4-trimethyl-pent-2-enyl)-N'-(3-methoxy-2-methyl-benzoyl)-hydrazide,

w) 3,5-Dimethyl-benzoic acid N-(1-tert-butyl-2-cyano-vinyl)-N'-(3-methoxy-2-methyl-benzoyl)-hydrazide,

x) 3,5-Dimethyl-benzoic acid N-(1-butyl-2,2-dimethyl-pentyl)-N'-(3-methoxy-2-methyl-benzoyl)-hydrazide, and

z) 3,5-Dimethyl-benzoic acid N-(1-butyl-2,2-dimethyl-pent-4-enyl)-N'-(3-methoxy-2-methyl-benzoyl)-hydrazide.

11. A method to modulate the expression of one or more exogenous genes in a subject, comprising administering to the subject an effective amount of a ligand of the formula:



wherein X and X' are independently O or S;

Y is:

(a) substituted or unsubstituted phenyl wherein the substitutents are independently 1-5 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro; or

(b) substituted or unsubstituted 2-pyridyl, 3-pyridyl, or 4-pyridyl, wherein the substitutents are independently 1-4 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro;

R^1 and R^2 are independently: H; cyano; cyano-substituted or unsubstituted (C_1-C_7) branched or straight-chain alkyl; cyano-substituted or unsubstituted (C_2-C_7) branched or straight-chain alkenyl; cyano-substituted or unsubstituted (C_3-C_7) branched or straight-chain alkenylalkyl; or together the valences of R^1 and R^2 form a (C_1-C_7) cyano-substituted or unsubstituted alkylidene group (R^aR^bC=) wherein the sum of non-substituent carbons in R^a and R^b is 0-6;

R^3 is H, methyl, ethyl, n-propyl, isopropyl, or cyano;

R^4, R^7, and R^8 are independently: H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro; and

R^5 and R^6 are independently: H, (C_1-C_4)alkyl, (C_2-C_4)alkenyl, (C_3-C_4) alkenylalkyl, halo (F, Cl, Br, I), C_1-C_4 haloalkyl, (C_1-C_4)alkoxy, hydroxy, amino, cyano, nitro, or together as a linkage of the type (–$OCHR^9CHR^{10}O$-) form a ring with the phenyl carbons to which they are attached; wherein R^9 and R^{10} are independently: H, halo, (C_1-C_3)alkyl, (C_2-C_3)alkenyl, (C_1-C_3)alkoxy(C_1-C_3)alkyl, benzoyloxy(C_1-C_3)alkyl, hydroxy(C_1-C_3)alkyl, halo(C_1-C_3)alkyl, formyl, formyl(C_1-C_3)alkyl, cyano, cyano(C_1-C_3)alkyl, carboxy, carboxy(C_1-C_3)alkyl, (C_1-C_3)alkoxycarbonyl(C_1-C_3)alkyl, (C_1-C_3)alkylcarbonyl(C_1-C_3)alkyl, (C_1-C_3)alkanoyloxy(C_1-C_3)alkyl, amino(C_1-C_3)alkyl, (C_1-C_3)alkylamino(C_1-C_3)alkyl (–$(CH_2)_nR^cR^e$), oximo (-CH=NOH), oximo(C_1-C_3)alkyl, (C_1-C_3)alkoximo (-C=NOR^d), alkoximo(C_1-

C_3)alkyl, (C_1-C_3)carboxamido (-C(O)NR^eR^f), (C_1-C_3)carboxamido(C_1-C_3)alkyl, (C_1-C_3)semicarbazido (-C=NNHC(O)NR^eR^f), semicarbazido(C_1-C_3)alkyl, aminocarbonyloxy (-OC(O)NHR^g), aminocarbonyloxy(C_1-C_3)alkyl, pentafluorophenyloxycarbonyl, pentafluorophenyloxycarbonyl(C_1-C_3)alkyl, p-toluenesulfonyloxy(C_1-C_3)alkyl, arylsulfonyloxy(C_1-C_3)alkyl, (C_1-C_3)thio(C_1-C_3)alkyl, (C_1-C_3)alkylsulfoxido(C_1-C_3)alkyl, (C_1-C_3)alkylsulfonyl(C_1-C_3)alkyl, or (C_1-C_5)trisubstituted-siloxy(C_1-C_3)alkyl (-$(CH_2)_nSiOR^dR^eR^g$); wherein n=1-3, R^c and R^d represent straight or branched hydrocarbon chains of the indicated length, R^e, R^f represent H or straight or branched hydrocarbon chains of the indicated length, R^g represents (C_1-C_3)alkyl or aryl optionally substituted with halo or (C_1-C_3)alkyl, and R^c, R^d, R^e, R^f, and R^g are independent of one another;

provided that

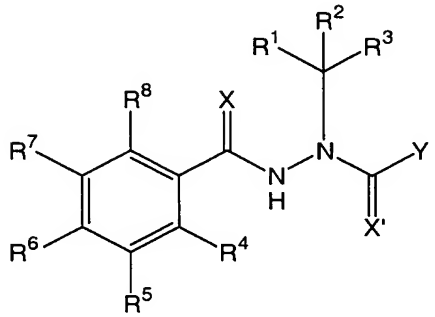
i when R^9 and R^{10} are both H, or

ii when either R^9 or R^{10} are halo, (C_1-C_3)alkyl, (C_1-C_3)alkoxy(C_1-C_3)alkyl, or benzoyloxy(C_1-C_3)alkyl, or

iii when R^5 and R^6 do not together form a linkage of the type (–$OCHR^9CHR^{10}O$-),

then the number of carbon atoms, excluding those of cyano substitution, for either or both of groups R^1 or R^2 is greater than 4, and the number of carbon atoms, excluding those of cyano substitution, for the sum of groups R^1, R^2, and R^3 is 10, 11, or 12.

12. A method for regulating endogenous or heterologous gene expression in a transgenic subject comprising contacting a ligand with an ecdysone receptor complex within the cells of the subject, wherein the cells further contain a DNA binding sequence for the ecdysone receptor complex when in combination with the ligand and wherein formation of an ecdysone receptor complex-ligand-DNA binding sequence complex induces expression of the gene, and where the ligand has the following formula:



wherein X and X' are independently O or S;

Y is:

(a) substituted or unsubstituted phenyl wherein the substitutents are independently 1-5 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro; or

(b) substituted or unsubstituted 2-pyridyl, 3-pyridyl, or 4-pyridyl, wherein the substitutents are independently from 1-4 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro;

R^1 and R^2 are independently: H; cyano; cyano-substituted or unsubstituted (C_1-C_7) branched or straight-chain alkyl; cyano-substituted or unsubstituted (C_2-C_7) branched or straight-chain alkenyl; cyano-substituted or unsubstituted (C_3-C_7) branched or straight-chain alkenylalkyl; or together the valences of R^1 and R^2 form a (C_1-C_7) cyano-substituted or unsubstituted alkylidene group (R^aR^bC=) wherein the sum of non-substituent carbons in R^a and R^b is 0-6;

R^3 is H, methyl, ethyl, n-propyl, isopropyl, or cyano;

R^4, R^7, and R^8 are independently: H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro; and

R^5 and R^6 are independently: H, (C_1-C_4)alkyl, (C_2-C_4)alkenyl, (C_3-C_4) alkenylalkyl, halo (F, Cl, Br, I), C_1-C_4 haloalkyl, (C_1-C_4)alkoxy, hydroxy, amino, cyano, nitro, or together as a linkage of the type (–$OCHR^9CHR^{10}O$-) form a ring with the phenyl carbons to which they are attached; wherein R^9 and R^{10} are independently: H, halo, (C_1-C_3)alkyl, (C_2-C_3)alkenyl, (C_1-C_3)alkoxy(C_1-C_3)alkyl, benzoyloxy(C_1-C_3)alkyl, hydroxy(C_1-C_3)alkyl, halo(C_1-C_3)alkyl, formyl, formyl(C_1-C_3)alkyl, cyano, cyano(C_1-C_3)alkyl, carboxy, carboxy(C_1-C_3)alkyl, (C_1-C_3)alkoxycarbonyl(C_1-C_3)alkyl, (C_1-C_3)alkylcarbonyl(C_1-C_3)alkyl, (C_1-C_3)alkanoyloxy(C_1-C_3)alkyl, amino(C_1-C_3)alkyl, (C_1-C_3)alkylamino(C_1-C_3)alkyl (–$(CH_2)_nR^cR^e$), oximo (-CH=NOH), oximo(C_1-C_3)alkyl, (C_1-C_3)alkoximo (-C=NOR^d), alkoximo(C_1-C_3)alkyl, (C_1-C_3)carboxamido (-$C(O)NR^eR^f$), (C_1-C_3)carboxamido(C_1-C_3)alkyl, (C_1-C_3)semicarbazido (-C=$NNHC(O)NR^eR^f$), semicarbazido(C_1-C_3)alkyl, aminocarbonyloxy (-$OC(O)NHR^g$), aminocarbonyloxy(C_1-C_3)alkyl, pentafluorophenyloxycarbonyl, pentafluorophenyloxycarbonyl(C_1-C_3)alkyl, p-toluenesulfonyloxy(C_1-C_3)alkyl, arylsulfonyloxy(C_1-C_3)alkyl, (C_1-C_3)thio(C_1-C_3)alkyl, (C_1-C_3)alkylsulfoxido(C_1-C_3)alkyl, (C_1-C_3)alkylsulfonyl(C_1-C_3)alkyl, or (C_1-C_5)trisubstituted-siloxy(C_1-C_3)alkyl (-$(CH_2)_nSiOR^dR^eR^g$); wherein n=1-3, R^c and R^d represent straight or branched hydrocarbon chains of the indicated length, R^e, R^f represent H or straight or branched hydrocarbon

chains of the indicated length, R^g represents (C_1-C_3)alkyl or aryl optionally substituted with halo or (C_1-C_3)alkyl, and R^c, R^d, R^e, R^f, and R^g are independent of one another;

provided that

i when R^9 and R^{10} are both H, or

ii when either R^9 or R^{10} are halo, (C_1-C_3)alkyl, (C_1-C_3)alkoxy(C_1-C_3)alkyl, or benzoyloxy(C_1-C_3)alkyl, or

iii when R^5 and R^6 do not together form a linkage of the type (–$OCHR^9CHR^{10}O$-),

then the number of carbon atoms, excluding those of cyano substitution, for either or both of groups R^1 or R^2 is greater than 4, and the number of carbon atoms, excluding those of cyano substitution, for the sum of groups R^1, R^2, and R^3 is 10, 11, or 12.

13. The method of Claim 12, wherein the ecdysone receptor complex is a chimeric ecdysone receptor complex and the DNA construct further comprises a promoter.

14. The method of Claim 12, wherein the subject is a plant.

15. The method of Claim 12, wherein the subject is a mammal.

16. A method of modulating the expression of a gene in a host cell comprising the steps of:

a) introducing into the host cell a gene expression modulation system comprising:

i) a first gene expression cassette that is capable of being expressed in a host cell comprising a polynucleotide sequence that encodes a first hybrid polypeptide comprising:

(a) a DNA-binding domain that recognizes a response element associated with a gene whose expression is to be modulated; and

(b) an ecdysone receptor ligand binding domain;

ii) a second gene expression cassette that is capable of being expressed in the host cell comprising a polynucleotide sequence that encodes a second hybrid polypeptide comprising:

(a) a transactivation domain; and

(b) a chimeric retinoid X receptor ligand binding domain; and

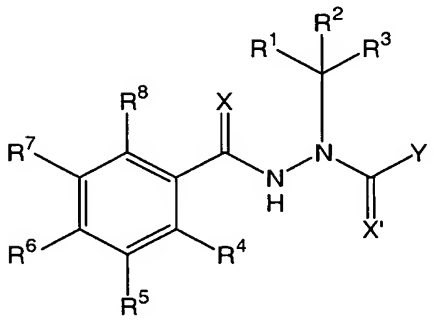
iii) a third gene expression cassette that is capable of being expressed in a host cell comprising a polynucleotide sequence comprising:

(a) a response element recognized by the DNA-binding domain of the first hybrid polypeptide;

(b) a promoter that is activated by the transactivation domain of the second hybrid polypeptide; and

(c) a gene whose expression is to be modulated; and

b) introducing into the host cell a ligand of the formula:



wherein X and X' are independently O or S;

Y is:

(a) substituted or unsubstituted phenyl wherein the substitutents are independently 1-5 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro; or

(b) substituted or unsubstituted 2-pyridyl, 3-pyridyl, or 4-pyridyl, wherein the substitutents are independently 1-4 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro;

R^1 and R^2 are independently: H; cyano; cyano-substituted or unsubstituted (C_1-C_7) branched or straight-chain alkyl; cyano-substituted or unsubstituted (C_2-C_7) branched or straight-chain alkenyl; cyano-substituted or unsubstituted (C_3-C_7) branched or straight-chain alkenylalkyl; or together the valences of R^1 and R^2 form a (C_1-C_7) cyano-substituted or unsubstituted alkylidene group (R^aR^bC=) wherein the sum of non-substituent carbons in R^a and R^b is 0-6;

R^3 is H, methyl, ethyl, n-propyl, isopropyl, or cyano;

R^4, R^7, and R^8 are independently: H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro; and

R^5 and R^6 are independently: H, $(C_1$-$C_4)$alkyl, $(C_2$-$C_4)$alkenyl, $(C_3$-$C_4)$ alkenylalkyl, halo (F, Cl, Br, I), C_1-C_4 haloalkyl, $(C_1$-$C_4)$alkoxy, hydroxy, amino, cyano, nitro, or together as a linkage of the type (–$OCHR^9CHR^{10}O$-) form a ring with the phenyl carbons to which they are attached; wherein R^9 and R^{10} are independently: H, halo, $(C_1$-$C_3)$alkyl, $(C_2$-$C_3)$alkenyl, $(C_1$-$C_3)$alkoxy$(C_1$-$C_3)$alkyl, benzoyloxy$(C_1$-$C_3)$alkyl, hydroxy$(C_1$-$C_3)$alkyl, halo$(C_1$-$C_3)$alkyl, formyl, formyl$(C_1$-$C_3)$alkyl, cyano, cyano$(C_1$-$C_3)$alkyl, carboxy, carboxy$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$alkoxycarbonyl$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$alkylcarbonyl$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$alkanoyloxy$(C_1$-$C_3)$alkyl, amino$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$alkylamino$(C_1$-$C_3)$alkyl (–$(CH_2)_nR^cR^e$), oximo (-CH=NOH), oximo$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$alkoximo (-C=NOR^d), alkoximo$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$carboxamido (-$C(O)NR^cR^f$), $(C_1$-$C_3)$carboxamido$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$semicarbazido (-C=NNHC(O)NR^cR^f), semicarbazido$(C_1$-$C_3)$alkyl, aminocarbonyloxy (-$OC(O)NHR^g$), aminocarbonyloxy$(C_1$-$C_3)$alkyl, pentafluorophenyloxycarbonyl, pentafluorophenyloxycarbonyl$(C_1$-$C_3)$alkyl, p-toluenesulfonyloxy$(C_1$-$C_3)$alkyl, arylsulfonyloxy$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$thio$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$alkylsulfoxido$(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$alkylsulfonyl$(C_1$-$C_3)$alkyl, or $(C_1$-$C_5)$trisubstituted-siloxy$(C_1$-$C_3)$alkyl (-$(CH_2)_nSiOR^dR^eR^g$); wherein n=1-3, R^c and R^d represent straight or branched hydrocarbon chains of the indicated length, R^e, R^f represent H or straight or branched hydrocarbon chains of the indicated length, R^g represents $(C_1$-$C_3)$alkyl or aryl optionally substituted with halo or $(C_1$-$C_3)$alkyl, and R^c, R^d, R^e, R^f, and R^g are independent of one another;

provided that

i when R^9 and R^{10} are both H, or

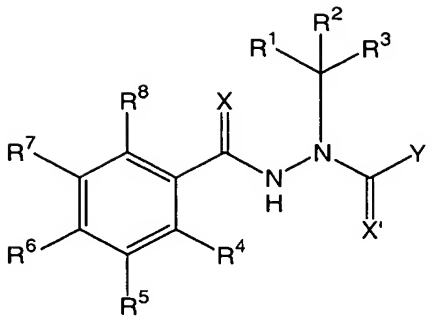
ii when either R^9 or R^{10} are halo, $(C_1$-$C_3)$alkyl, $(C_1$-$C_3)$alkoxy$(C_1$-$C_3)$alkyl, or benzoyloxy$(C_1$-$C_3)$alkyl, or

iii when R^5 and R^6 do not together form a linkage of the type (–$OCHR^9CHR^{10}O$-),

then the number of carbon atoms, excluding those of cyano substitution, for either or both of groups R^1 or R^2 is greater than 4, and the number of carbon atoms, excluding those of cyano substitution, for the sum of groups R^1, R^2, and R^3 is 10, 11, or 12.

17. A method for producing a polypeptide comprising the steps of:

a) selecting a cell which is substantially insensitive to exposure to a ligand comprising the formula:



wherein X and X' are independently O or S;

Y is:

(a) substituted or unsubstituted phenyl wherein the substitutents are independently 1-5 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro; or

(b) substituted or unsubstituted 2-pyridyl, 3-pyridyl, or 4-pyridyl, wherein the substitutents are independently 1-4 H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro;

R^1 and R^2 are independently: H; cyano; cyano-substituted or unsubstituted (C_1-C_7) branched or straight-chain alkyl; cyano-substituted or unsubstituted (C_2-C_7) branched or straight-chain alkenyl; cyano-substituted or unsubstituted (C_3-C_7) branched or straight-chain alkenylalkyl; or together the valences of R^1 and R^2 form a (C_1-C_7) cyano-substituted or unsubstituted alkylidene group (R^aR^bC=) wherein the sum of non-substituent carbons in R^a and R^b is 0-6;

R^3 is H, methyl, ethyl, n-propyl, isopropyl, or cyano;

R^4, R^7, and R^8 are independently: H, (C_1-C_4)alkyl, (C_1-C_4)alkoxy, (C_2-C_4)alkenyl, halo (F, Cl, Br, I), (C_1-C_4)haloalkyl, hydroxy, amino, cyano, or nitro; and

R^5 and R^6 are independently: H, (C_1-C_4)alkyl, (C_2-C_4)alkenyl, (C_3-C_4) alkenylalkyl, halo (F, Cl, Br, I), C_1-C_4 haloalkyl, (C_1-C_4)alkoxy, hydroxy, amino, cyano, nitro, or together as a linkage of the type (–OCHR^{9}CHR^{10}O-) form a ring with the phenyl carbons to which they are attached; wherein R^9 and R^{10} are independently: H, halo, (C_1-C_3)alkyl, (C_2-C_3)alkenyl, (C_1-C_3)alkoxy(C_1-C_3)alkyl, benzoyloxy(C_1-C_3)alkyl, hydroxy(C_1-C_3)alkyl, halo(C_1-C_3)alkyl, formyl, formyl(C_1-C_3)alkyl, cyano, cyano(C_1-C_3)alkyl, carboxy, carboxy(C_1-C_3)alkyl, (C_1-C_3)alkoxycarbonyl(C_1-C_3)alkyl, (C_1-C_3)alkylcarbonyl(C_1-C_3)alkyl, (C_1-C_3)alkanoyloxy(C_1-C_3)alkyl, amino(C_1-C_3)alkyl, (C_1-C_3)alkylamino(C_1-C_3)alkyl (–$(CH_2)_nR^cR^e$), oximo (-CH=NOH), oximo(C_1-C_3)alkyl, (C_1-C_3)alkoximo (-C=NOR^d), alkoximo(C_1-

C_3)alkyl, (C_1-C_3)carboxamido (-C(O)NR^eR^f), (C_1-C_3)carboxamido(C_1-C_3)alkyl, (C_1-C_3)semicarbazido (-C=NNHC(O)NR^eR^f), semicarbazido(C_1-C_3)alkyl, aminocarbonyloxy (-OC(O)NHR^g), aminocarbonyloxy(C_1-C_3)alkyl, pentafluorophenyloxycarbonyl, pentafluorophenyloxycarbonyl(C_1-C_3)alkyl, p-toluenesulfonyloxy(C_1-C_3)alkyl, arylsulfonyloxy(C_1-C_3)alkyl, (C_1-C_3)thio(C_1-C_3)alkyl, (C_1-C_3)alkylsulfoxido(C_1-C_3)alkyl, (C_1-C_3)alkylsulfonyl(C_1-C_3)alkyl, or (C_1-C_5)trisubstituted-siloxy(C_1-C_3)alkyl (-$(CH_2)_n$$SiOR^dR^eR^g$); wherein n=1-3, R^c and R^d represent straight or branched hydrocarbon chains of the indicated length, R^e, R^f represent H or straight or branched hydrocarbon chains of the indicated length, R^g represents (C_1-C_3)alkyl or aryl optionally substituted with halo or (C_1-C_3)alkyl, and R^c, R^d, R^e, R^f, and R^g are independent of one another;

provided that

i when R^9 and R^{10} are both H, or

ii when either R^9 or R^{10} are halo, (C_1-C_3)alkyl, (C_1-C_3)alkoxy(C_1-C_3)alkyl, or benzoyloxy(C_1-C_3)alkyl, or

iii when R^5 and R^6 do not together form a linkage of the type (–$OCHR^9CHR^{10}O$-), then the number of carbon atoms, excluding those of cyano substitution, for either or both of groups R^1 or R^2 is greater than 4, and the number of carbon atoms, excluding those of cyano substitution, for the sum of groups R^1, R^2, and R^3 is 10, 11, or 12;

b) introducing into the cell:

1) a DNA construct comprising:

i) an exogenous gene encoding the polypeptide; and

ii) a response element;

wherein the gene is under the control of the response element; and

2) an ecdysone receptor complex comprising:

i) a DNA binding domain;

ii) a binding domain for the ligand; and

iii) a transactivation domain; and

c) exposing the cell to the ligand.